

I n f o r m a t i o n   M e m o r a n d u m

# **Year 2000**

## **Bay Area Freeway Congestion Data**

California Department of Transportation  
District 4  
Office of Highway Operations

June 28, 2001

## Table 1

# TOTAL DISTRICT DAILY DELAY

District 4 Highway Congestion Monitoring Program

	2000	1999	1998	1997	1996	1995	1994	1993
<b>Daily Delay</b> (vehicle-hours)	<b>177,600</b>	128,300	112,000	—	90,000	68,500	60,400	63,800
Change from prior year	<b>+38%</b>	+15%	+12%	—	+31%	+13%	-5%	0%
<b>No. of congested directional miles</b>	<b>390</b>	338	327	—	284	268	208	217
Change from prior year	<b>+15%</b>	+3%	+15%	—	+6%	+29%	-4%	-7%
<b>Cost per day</b>	<b>\$2,142,000</b>	\$1,477,000	\$1,249,000	—	\$841,000	\$641,000	\$565,000	\$597,000

## Table 2

# DAILY DELAY BY COUNTY

District 4 Highway Congestion Monitoring Program

	2000	1999	1998	1997	1996	1995	1994	1993
<b>Alameda</b>	<b>61,700</b>	44,300	41,800	—	35,400	25,600	18,800	19,400
<b>Contra Costa</b>	<b>16,200</b>	14,500	14,000	—	12,500	13,400	15,100	16,500
<b>Marin</b>	<b>9,900</b>	7,700	7,200	—	6,300	4,900	6,700	5,500
<b>San Francisco</b>	<b>12,500</b>	9,100	6,900	—	6,500	6,700	7,700	7,700
<b>San Mateo</b>	<b>18,100</b>	11,500	9,800	—	7,000	3,100	1,400	1,400
<b>Santa Clara</b>	<b>51,700</b>	36,900	29,300	—	20,500	13,000	8,800	12,800
<b>Solano</b>	<b>3,200</b>	700	400	—	70	130		
<b>Sonoma</b>	<b>4,300</b>	3,600	2,800	—	1,800	1,700	1,900	500

### NOTES

- (1) No HICOMP report was published in 1997 and 1999.
- (2) Daily delays were based on an estimated bottleneck capacity of 1,800 veh/hour/lane from 1988 through 1991. From 1992 to 1995, a bottleneck capacity of 2,000 veh/hour/lane was used. A bottleneck capacity of 2,200 has been used since 1996.
- (3) Through 1994, congestion data was collected for Santa Cruz County, and was not collected for Solano County. Beginning in 1995, data was collected for Solano County, but not for Santa Cruz County.



**Office of Highway Operations**  
**Caltrans - District 4**

### Table 3

## DIRECTIONAL MILES of CONGESTION BY COUNTY

District 4 Highway Congestion Monitoring Program

	2000	1999	1998	1997	1996	1995	1994	1993
<b>Alameda</b>	<b>85</b>	79	83	—	85	76	53	57
<b>Contra Costa</b>	<b>52</b>	50	56	—	51	51	52	54
<b>Marin</b>	<b>23</b>	22	22	—	19	20	17	17
<b>San Francisco</b>	<b>31</b>	26	20	—	20	23	16	17
<b>San Mateo</b>	<b>52</b>	41	33	—	27	20	16	14
<b>Santa Clara</b>	<b>110</b>	92	93	—	70	61	41	51
<b>Solano</b>	<b>14</b>	2	1	—	1	2		
<b>Sonoma</b>	<b>23</b>	26	19	—	11	15	14	5
<b>TOTALS</b>	<b>390</b>	338	327	—	284	268	208	217

#### NOTE

- (1) No HICOMP report was published in 1997 and 1999.
- (2) Through 1994, congestion data was collected for Santa Cruz County, and was not collected for Solano County. Beginning in 1995, data was collected for Solano County, but not for Santa Cruz County.



**Office of Highway Operations**  
**Caltrans - District 4**

**Table 4A**  
**AM PEAK PERIOD CONGESTION LOCATIONS**  
 Ordered by County and Route

COUNTY	ROUTE	DIR	DELAY(veh-hr)	DURATION	LOCATION
ALA	24	E	790	0645-0940	Rte 13 to Caldecott Tunnel
ALA	24	W	480	0750-0925	Rte 13 to Off to Rte 580
CC/ALA	80	W	10340	0525-1015	Rte 4 to SFOBB Metering Lights
ALA	84	S	3180	0545-0945	Rte 880 to Dumbarton Br Toll Plaza
ALA	92	W	2680	0530-0950	Rte 880 to San Mateo Br Toll Plaza
ALA	238	N	160	0625-0915	At Rte 238/880 I/C
ALA	580	W	2830	0620-0920	Vasco Rd to Portola
ALA	580	W	180	0620-0920	At Airway
ALA	580	W	250	0710-0930	Redwood Rd to Rte 238
ALA	580	W	290	0715-0910	MacArthur to Frutivale
ALA	580	W	1200	0545-0915	Rte 24 to Rte 80
ALA	680	S	8880	0520-1030	Sunol Rd to S/O Rte 262
ALA	880	N	3380	0535-1005	0.5 Mile S/O Grand Ave to SFOBB
ALA	880	S	2100	0620-0935	Washington to Rte 92
ALA	880	S	1360	0615-0905	Industrial to Alvarado
ALA	880	S	8210	0550-1020	S/O Rte 84 to N/O Dixon Landing
CC	4	W	1630	0520-0850	G St to Railroad
CC	24	W	370	0705-0850	At Camino Pablo I/C
CC	242	S	410	0550-0845	Concord Ave to Rte 680
CC	580	W	710	0640-0920	Garrard Blvd to Richmond Br Toll Plaza
CC	680	N	110	0750-0855	At Alcosta I/C
CC	680	S	330	0640-0915	At Stone Valley & At Diablo Rd
CC	680	S	1300	0655-0935	Rte 24 to N/O Livorna
CC	680	S	360	0640-0810	Rte 242 to Geary Rd
CC	680	S	150	0735-0850	At Rte 4 & At Concord/Contra Costa
CC	680	S	970	0640-0850	At Benicia Br Toll Plaza & Arthur to Rte 4
MRN/SF	101	S	1490	0650-0945	Spencer Rd to Golden Gate Bridge Toll Plaza
MRN	101	S	60	0720-0910	At Lucky Drive, Casa Buena Drive
MRN	101	S	5060	0630-1000	Rowland Blvd to Junction Rte 580
SCL	17	N	540	0700-0915	Hamilton Ave to Camden Ave & At Rte 280
SCL	85	N	410	0600-0915	At Bernal Rd On (meter Lights)
SCL	85	N	1460	0630-0900	Union Ave to Rte 87
SCL	85	N	390	0645-0900	Saratoga Ave to Rte 17



**Table 4A**  
**AM PEAK PERIOD CONGESTION LOCATIONS**  
 Ordered by County and Route

COUNTY	ROUTE	DIR	DELAY(veh-hr)	DURATION	LOCATION
SCL	85	N	1460	0645-1000	Rte 280 to Fremont Ave & At Rte 101
SCL	87	N	250	0745-0930	Almaden Expwy to Capitol Expwy
SCL	101	N	1660	0530-0845	Tennant Ave to Burnett Ave O.C.
SCL	101	N	600	0630-0830	Hellyer Ave to Tully Rd
SCL	101	N	1910	0615-0930	Rte 280 to North of Mckee Rd
SCL	101	N	2210	0600-1000	13th St to Trimble Rd
SCL	101	N	280	0715-0915	Rte 237 to Rte 85
SCL	101	N	360	0700-0930	Rengstorff Ave to Oregon Expwy
SCL	101	S	230	0730-0900	Ellis St to Lawrence Expwy
SCL	237	E	200	0745-0930	Rte 85 to Dana St
SCL	237	E	430	0730-0930	At Rte 101 & At Lawrence Expwy
SCL	237	W	820	0615-0930	Rte 880 to Zanker Ave
SCL	280	N	90	0730-0830	Rte 101 to Rte 87
SCL	280	N	1890	0645-0915	Southwest Expwy to Rte 880
SCL	280	N	660	0700-0930	Winchester Blvd to Lawrence Expwy
SCL	280	N	90	0730-0845	Rte 85 to 1 Mi. N/O Foothill Expwy
SCL	280	S	60	0745-0845	At De Anza Blvd.
SCL	680	N	520	0645-0830	Rte 101 to Mckee Rd
SCL	680	N	50	0745-0900	At Capitol Ave
SCL	680	S	420	0645-0815	At Rte 101
SCL	880	N	1270	0700-1000	Bascom Ave to Brokaw Rd
SF/ALA	80	W	1380	0630-1015	1 Mi. E/O Ala/SF Cnty Line to Fremont St
SF	80	E	160	0730-0905	Rte 101 to Sterling St
SF/SM	101	S	570	0715-0855	From Army St to Harney Way
SF	101	N	490	0725-0910	From Silver Ave to Army St
SF	101	S	40	0745-0830	So Van Ness to 101/80
SF	280	N	510	0720-0835	San Jose Ave to Rte 101
SF	280	N	230	0725-0940	At Rte 101 & 6th St to King St
SM	92	W	120	0730-0845	Rte 101 & At Alameda De Las Pulgas
SM	92	E	80	0800-0915	At Ralston Ave & At Alameda De Las Pulgas
SM/SCL	101	S	1220	0645-0915	Woodside Rd to Rte 85
SM	101	N	200	0700-0845	Marsh Rd to Woodside Rd
SM	101	S	4520	0645-1030	Rte 380 to Hillsdale Blvd
SM	101	S	180	0715-0900	At Marina Blvd
SM	101	N	500	0730-0915	Hillsdale Blvd to Third Ave
SM	280	S	1580	0635-0900	John Daly Blvd to Rte 380
SM	280	S	220	0715-0845	Rte 380 to Rte 35



**Table 4A**  
**AM PEAK PERIOD CONGESTION LOCATIONS**  
 Ordered by County and Route

COUNTY	ROUTE	DIR	DELAY(veh-hr)	DURATION	LOCATION
SM	280	S	140	0745-0900	Farm Hill Blvd to Woodside Rd
SM	280	S	880	0730-0945	Rte 92 to S/O Edgewood Rd
SM	280	S	150	0730-0830	Trousdale Dr to Hayne Rd
SOL	37	W	60	0615-0720	Mare Island I/C to PM 6
SOL	80	W	1500	0555-0820	Redwood St to Carquinez Br Toll Plaza
SOL	80	W	180	0605-0715	W. Texas St to Suisun Valley Rd
SOL	680	S	120	0630-0805	Bayshore Rd to Ben./Mart. Br Toll Plaza
SOL	680	S	40	0640-0740	At Parish Rd
SOL	780	E	230	0625-0805	Seventh St to Ben./Mart. Br Toll Plaza
SON	101	S	1110	0530-740	Redwood Rd to Kastania Rd
SON	101	S	50	0740-0855	At Pepper Rd
SON	101	S	410	0625-0715	Rte 12 to Hearn Avenue
SON	101	S	330	0720-0855	Shiloh Rd to River Rd
SON	101	N	410	0710-0915	Sta. Rosa Ave to Third St



# TABLE 4B

## PM PEAK PERIOD CONGESTION LOCATIONS

Ordered by County and Route

COUNTY	ROUTE	DIR	DELAY(veh-hr)	DURATION	LOCATION
ALA	24	E	2080	1520-1840	Claremont to Caldecott Tunnel
SF/ALA	80	E	1450	1530-1850	Sterling St to Rte 580
ALA	80	E	1830	1520-1835	Rte 580 to Gilman St
ALA/SF	80	W	2610	1615-1920	At SFOBB Toll Plaza & County Line to Fifth St
ALA	80	W	310	1655-1815	Gilman St to Rte 580/880 I/C
ALA	84	N	160	1525-1815	Newark to Rte 880
ALA	238	S	150	1450-1630	Rte 880 to Rte 185
ALA	580	E	730	1545-1835	E/O Livermore to W/O Rte 84
ALA	580	E	2930	1510-1845	Hopyard to W/O El Charro Rd
ALA	580	E	210	1640-1815	Oakland Rd to Coolidge Ave
ALA	580	W	220	1600-1900	Strobridge to Rte 238
ALA	680	N	980	1505-1805	At Scott Ck & At Rte 262 to Durham
ALA	880	N	860	1540-1845	S/O Fremont to Auto Mall Parkway
ALA	880	N	290	1555-1820	At Mowry & At Decoto Rd
ALA	880	N	1440	1500-1815	Fremont to Industrial
ALA	880	N	440	1510-1820	Rte 92 to Hesperian Blvd
ALA	880	N	140	1730-1830	Grand Ave to SFOBB
CC	4	E	800	1545-1815	Rte 242 to Port Chicago
CC	4	E	780	1545-1845	Bay Point to Bailey Rd
CC	4	E	1370	1525-1920	Bailey Rd to L St
CC	24	W	1320	1520-1930	Camino Pablo to Caldecott Tunnel
CC	80	E	910	1525-1845	Central Ave to San Pablo Ave
CC	80	E	370	1550-1815	Richmond Parkway to Pinole Valley Rd
CC	242	N	120	1500-1810	N/O Clayton Rd to Grand On
CC	680	N	320	1650-1835	N/O Bollinger to Crow Canyon
CC	680	N	390	1545-1730	At Sycamore & At El Pintado & At Stone Valley
CC	680	N	520	1545-1810	So. Main to Rte 24 & Rte 24 to Treat Bl
CC	680	N	180	1635-1810	Burnett Ave to Rte 4
CC	680	N	1790	1520-1900	Arthur to Benicia Br Toll Plaza
MRN/SF	101	S	840	1530-1915	Waldo Tunnel to Golden Gate Bridge Toll Plaza
MRN	101	N	2020	1520-1835	Seminary Rd to Lincoln Ave
MRN	101	N	380	1525-1800	De Long Ave to Begin Expwy
MRN	101	N	160	1515-1825	Sanitary Rd to San Antonio Rd
MRN	580	W	690	1425-1910	At Rte 101
SCL	17	S	190	1615-1845	N/O Lark Ave
SCL	85	S	100	1700-1815	At Rte 87
SCL	85	S	460	1615-1915	Bascom Ave to Union Ave



# TABLE 4B

## PM PEAK PERIOD CONGESTION LOCATIONS

Ordered by County and Route

COUNTY	ROUTE	DIR	DELAY(veh-hr)	DURATION	LOCATION
SCL	85	S	840	1600-1915	Stevens Cr Blvd to N/O of Saratoga Ave
SCL	85	S	1140	1530-1915	Evelyn Ave to Fremont Ave
SCL	87	S	1750	1545-1930	Rte 280 to Alma Ave & At Curtner Ave
SCL	101	S	1460	1530-1915	Rte 85 to Scheller Rd
SCL	101	S	1070	1700-1915	Rte 280/680 I/C to Tully Rd
SCL	101	S	5510	1500-1900	Fair Oaks Ave to 13th St
SCL	101	N	110	1700-1830	At Great America Pkwy
SCL/SM	101	N	2380	1530-1915	Rte 237 to University Ave
SCL	101	S	2360	1500-1915	San Antonio Rd to Rte 85
SCL	237	E	3470	1530-1915	N. First St to Rte 880
SCL	237	W	220	1730-1915	Middlefield Rd to Rte 85
SCL	237	W	310	1730-1930	Rte 880 to Zanker Ave & At Mathilda Ave
SCL	280	N	90	1730-1845	11th St to Rte 87
SCL	280	N	80	1715-1815	At Rte 880
SCL	280	S	1490	1630-1900	Rte 17 to 11th St
SCL	280	S	270	1530-1730	Stevens Cr Blvd to Saratoga Ave
SCL	280	S	760	1630-1900	Page Mill Expwy to Magdalena Ave
SCL	680	S	1990	1600-1900	Rte 237 to Berryessa Rd
SCL	680	N	1400	1545-1845	Calaveras Rd to Scott Cr Rd
SCL	880	S	620	1700-1830	Rte 101 to Bascom Ave
SCL	880	S	2140	1430-1930	Great Mall Pkwy to Brokaw Rd
SCL/Ala	880	N	2940	1540-1900	Rte 101 to N/O Dixon Landing
SF	80	E	3170	1500-1915	Rte 101 to Sterling St
SF	80	W	80	1650-1820	From 5th St to 80/101 I/C
SF	101	N	2010	1500-1800	Army St to Rte 80
SF	101	N	220	1700-1935	Van Ness Off to Fell St I/S
SF	101	S	100	1615-1825	So. Van Ness to Rte 80
SF	280	N	190	1615-1845	6th St to King /5th St I/S
SF	280	S	230	1710-1845	Rte 101 to Monterey Ave
SF	280	S	190	1645-1825	From 6th St to Pennsylvania Ave
SM	92	W	290	1700-1830	Rte 101 to Hillsdale Blvd. & At Ralston Ave
SM/Ala	92	E	4230	1445-1900	1.5 Mi E/O Beg of San Mateo Br to Rte 880
SM	101	N	650	1700-1915	At Marsh Rd
SM	101	N	870	1630-1900	Whipple Ave to Ralston Ave
SM	101	N	1640	1600-1945	Rte 92 to Peninsula Ave & At Broadway
SM	101	S	720	1630-1900	Woodside Ave to Willow Rd
SM	101	S	90	1530-1630	At Poplar Ave
SM	101	N	90	1730-1815	So. Airport Blvd to Marina Blvd



**TABLE 4B**  
**PM PEAK PERIOD CONGESTION LOCATIONS**  
 Ordered by County and Route

COUNTY	ROUTE	DIR	DELAY(veh-hr)	DURATION	LOCATION
SM	280	N	250	1730-1900	Alpine Rd to Woodside Rd
SM	280	N	220	1730-1900	Rte 92 to Bunker Hill Dr
SM	280	N	1070	1645-1900	Crystal Springs Ave to Westborough Blvd
SM	380	W	100	1645-1815	Rte 82 to Rte 280
SOL	80	E	540	1520-1810	Jameson Canyon Rd(Rte 12) to Suisun Valley Rd
SOL	80	E	70	1655-1755	Beck Rd to Airbase Parkway
SOL	680	N	460	1535-1830	At Rte 80
SON	101	N	130	1610-1755	At Old Redwood Highway(Pengrove)
SON	101	N	790	1500-1835	Santa Rosa Ave to Rte 12
SON	101	N	100	1655-1815	Rte 12 to Steele Ln & At Mendocino Ave
SON	101	S	950	1435-1755	Hopper Ave to Rte 12



**TABLE 5**  
**SUMMARY of DAILY DELAY and CONGESTED LENGTH**  
 Ordered by Route

ROUTE	DAILY DELAY (vehicle-hours)			DIRECTIONAL MILES of CONGESTION		
	A.M.	P.M.	TOTAL	A.M.	P.M.	TOTAL
<b>1</b>						
<b>4</b>	1,630	2,950	4,580	4.9	7.8	13
<b>12</b>						
<b>13</b>						
<b>17</b>	540	190	730	1.6	0.6	2
<b>24</b>	1,640	3,400	5,040	5.0	5.0	10
<b>29</b>						
<b>37</b>	60		60	1.5		2
<b>80</b>	13,560	11,340	24,900	18.5	22.8	41
<b>84</b>	3,180	160	3,340	2.8	1.0	4
<b>85</b>	3,720	2,540	6,260	8.9	9.0	18
<b>87</b>	250	1,750	2,000	1.5	1.9	3
<b>92</b>	2,880	4,520	7,400	5.9	11.0	17
<b>101</b>	23,890	24,650	48,540	66.1	58.5	125
<b>237</b>	1,450	4,000	5,450	4.7	5.6	10
<b>238</b>	160	150	310	0.6	1.2	2
<b>242</b>	410	120	530	1.3	1.1	2
<b>280</b>	6,500	4,840	11,340	20.1	17.3	37
<b>380</b>		100	100		0.5	1
<b>505</b>						
<b>580</b>	5,460	4,780	10,240	9.7	5.9	16
<b>680</b>	13,250	8,030	21,280	27.2	21.3	49
<b>780</b>	230		230	2.0		2
<b>880</b>	16,320	8,870	25,190	19.2	18.5	38
<b>980</b>						
<b>TOTALS</b>	<b>95,100</b>	<b>82,400</b>	<b>177,600</b>	<b>201</b>	<b>189</b>	<b>390</b>



## TEN WORST CONGESTION LOCATIONS in 2000 \*

	County-Route, direction, peak, limits of congestion	Delay (veh-hrs)	1999 rank
<b>1</b>	Ala/CC-80, westbound, A.M.; Rte 4 to SFOBB metering lights	10,340	1
<b>2</b>	Ala -680, southbound, A.M.; Sunol Rd to south of Rte 262	8,880	2
<b>3</b>	Ala-880, southbound, A.M.; south of Rte 84 to north of Dixon Landing Rd	8,210	3
<b>4</b>	SCI-101, southbound, P.M.; Fair Oaks Ave to 13th St	5,510	8
<b>5</b>	SF-80 & 101, eastbound & northbound, P.M.; Army St to west end of SFOBB	5,180	4
<b>6</b>	Mrn-101, southbound, AM; Rowland Blvd to Rte 580	5,060	7
<b>7</b>	SM-101, southbound, AM; Rte 380 to Hillsdale Blvd	4,520	13
<b>8</b>	SM/Ala-92, eastbound, P.M.; 1.5 mile east of beg. of San Mateo Bridge to Rte 880	4,230	5
<b>9</b>	SCI-237, eastbound, P.M.; North First St to Rte 880	3,470	10
<b>10</b>	Ala-880, northbound, A.M.; 0.5 mile south of Grand Ave to SFOBB	3,380	15

\* These "rankings" are somewhat subjective in that the congestion locations shown are for routes in which continuous stop & go conditions occur with few, if any, breaks in the queue. Thus, corridors which have equally severe delays but where congestion is broken into several segments may rank lower in this type of comparison.

### Locations from 1999 Ten Worst list not appearing on 2000 list

1999 rank	County-Route, direction, peak, limits of congestion	2000 rank
5	SCI/Ala-880, northbound, P.M.; Montague Expwy to Dixon Landing Rd	13
9	Ala-84, westbound, A.M.; Newark Blvd to Dumbarton Bridge Toll Plaza	11

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# METHODOLOGY

The information contained in this report represents average freeway traffic conditions on a typical weekday in 2000. On many routes, there is substantial day-to-day variation in travel conditions. Congestion can be either recurrent or non-recurrent. Recurrent congestion is generally typified by everyday rush-hour stop & go conditions, occurring when the demand for the freeway's capacity is exceeded. Non-recurrent congestion is caused by incidents, maintenance work or construction activities where normal capacity is temporarily reduced, or holidays or special events where peak demands are higher than normal. Non-recurrent congestion is not included in this inventory.

The primary purpose of the program is document freeway traffic conditions; it is not the intention of this program to determine the specific causes of congestion at individual locations. Thus, specific bottleneck locations are not identified in this report. In addition, traffic conditions on conventional highways, expressways, and local streets are not recorded as part of this program. A more detailed description of the data collection and analysis methodology is provided in a September 1996 report by the Caltrans District 4 Office of Highway Operations entitled "Congestion Monitoring Procedures & Guidelines."

## DEFINITION OF CONGESTION

Congestion is defined as a condition where the average speed drops below 35 mph for 15 minutes or more on a typical weekday. Three parameters are used in this report to describe the congestion.

**MAGNITUDE** is the difference in travel time between 35 mph and the lower congested speed, expressed in terms of daily vehicle-hours of delay.

**EXTENT** is the length of freeway segment, by direction, experiencing speeds below 35 mph for 15 minutes or more, expressed in terms of directional miles of congestion.

**DURATION** is the length of time a freeway segment remains congested, expressed in hours, as shown in Exhibits 2 and 3.

## DATA COLLECTION

The "floating car" method is used to gather field data on freeway congestion. Cars equipped with a laptop computer that records speeds, distances, and times are driven along the section of the freeway under study. Trips are generally spaced 15 to 30 minutes apart, and are made on segments approximately seven miles long. Monitoring is conducted during peak commute periods, generally Tuesday through Thursday, and at least twice per year (usually in the Spring and Fall). This provides a data set that allows the calculation of average congestion conditions for each route segment. The data collected are reduced and plotted on travel time and speed profile charts, a sample of which is shown in Exhibit 1. Shown on each chart are a schematic layout of the freeway section, the worst-case speed profile for each direction, and a graph showing the variation of travel time over the entire section during each peak period for each direction.

## ANALYSIS

An estimate is made of the aggregate delay for each freeway segment in which congestion occurs. Calculations are based on the delay data gathered from the floating car runs and estimated bottleneck capacities. This provides a single numerical value that combines the total number of vehicles affected and the overall amount of congestion. It should be noted that the estimates are based on a limited number of observations, and it can be expected that the actual delay may vary considerably from day to day as well as seasonally.

The average daily "cost" of congestion is developed using a combination of travel time and excess fuel costs. Travel time costs are based on \$0.15 per minute per vehicle. The excess fuel cost is based on an estimate of 1.719 gallons of fuel for each vehicle-hour of delay. Both factors are based on uniform statewide values, and are adjusted periodically for inflation. No adjustments have been made to account for higher costs of living in certain areas of the state.

Capacities of 2,200 vehicles per hour per lane (vphpl) were used for most bottlenecks. This value is based on direct field observations at numerous freeway bottlenecks throughout the Bay Area, and is indicative of the more aggressive driving behavior seen in many urban areas throughout the country. Bottleneck capacities of 1,800 vphpl were used in HICOMP reports through 1991, and 2,000 vphpl until 1995.

